Homework 4

CST 311, Introduction to Computer Networks, Spring 2019

READ INSTRUCTIONS CAREFULLY BEFORE YOU START THE HOMEWORK.

This homework is due on Sunday, March 31, 2019.

Homework must be submitted electronically through iLearn on https://ilearn.csumb.ed u by 11:55 pm on the due date. Late homeworks will not be accepted.

Homework must in pdf format only. Any other formats will not be accepted. You must submit a single file for the entire homework. The naming convention of the file should be HW4_yourlastname.pdf. **Put your name in the document as well.** Your homework submission should present the problems in the original order and be properly labeled.

This homework is worth 100 points. Each part of a question carries equal weight unless specified otherwise.

Name (1 points): _____Daniel Ochoa Aguila _____

Network Layer

Section 1:

(50 points) Answer the following questions in 4-5 sentences:

1. Explain the difference between routing and forwarding.
   Routing and forwarding are similar concepts these two concepts deal with moving packets through a network. The difference between them is that routing is the determine path taken by packets from source to destination while forwarding is the movement of packets from one router input to appropriate router output. During class the example given was that routing is the process of planning a trip from source to destination and forwarding is the process of getting through a single interchange.

2. What is the Internet's service model? Explain. Does it offer any guarantees? Does it provide any congestion feedback?
   The internet's service model is a system that defines the characteristics of the end to end transport of data between one edge host to another. It offers no guarantees. It also does not provide any congestion feedback, but it can be inferred via loss.

3. How is Virtual Circuit network different from datagram network? Give an example architecture that uses them.
   In a Virtual Circuit network, a "call" or connection has to be established before any data can flow through that connection must be torn down after it is no longer needed. A datagram network in the other hand does not need to establish a connection before sending data. An example of a Datagram network is the internet, and an example of a Virtual Circuit network is ATMs.

4. Explain priority scheduling and FIFO scheduling?
   Priority scheduling designates different priority levels to different packets and processes the packets from highest to lowest priority. In FIFO scheduling priority is designated based on the time a packet arrives therefore which ever packet arrives first is the packet that gets processed first.

5. What is DHCP used for? Explain the interaction between a client and a DHCP server.
   DHCP is used for dynamically designating Ip addresses to host when they first arrive into a network. The interaction between a client and a DHCP server starts with the client or host looking/discovering a DHCP server. The client broadcast a message to the server and the DHCP server responds with offers which are multiple IP addresses that the host can use. Then the host requests an IP address finally the DHCP server responds with an ack.

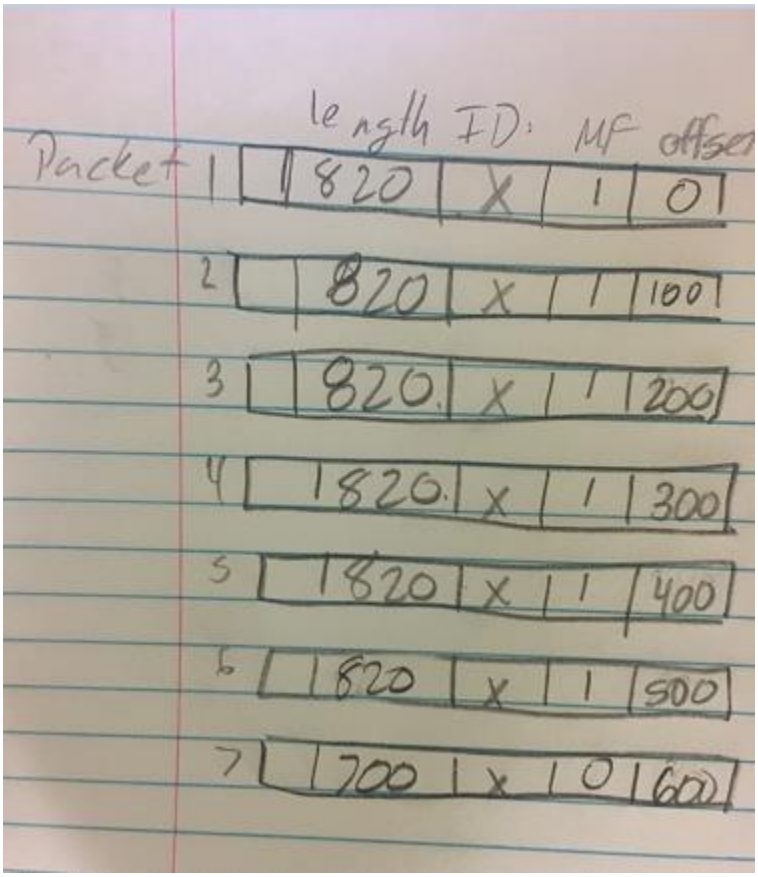
Section 2:

This section contains problem solving questions.

1. (12 points) Suppose you want to send forward a datagram that is 5500B long over a network where the MTU is 820 B. Assume the header size is 20B.
   a. How many fragments will it take to send the entire datagram across?
      5500 – 800 = 4700
      4700 – 800 = 3900

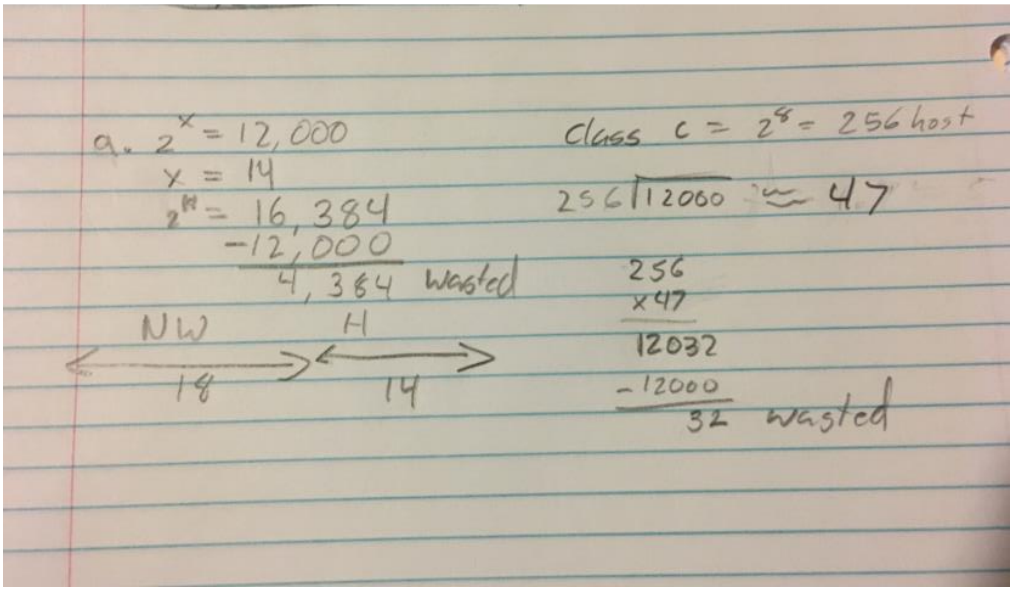
3900 – 800 = 3100
3100 – 800 = 2300
2300 – 800 = 1500
1500 – 800 = 700
There needs to be 6 fragment of size 820 and one fragment of size 700.

b. Draw all fragments and give the offset value and fragmentation flag of each fragment.



2. (12 points) Let's say you want to setup a network with 12000 hosts and assuming you are using classful addressing,

   a. What kind of addresses would you give out to maximize address space utilization?
   We would need to give out 47 class c addresses which in doing so we would only be wasting 32 host.



   b. Give an example of address space for 12000 hosts.
   10.53.25.0
   .
   .
   .
   .
   10.53.71.255

3. (25 points) Suppose a router has built up the routing table shown in table below. The router can deliver packets directly over interfaces 0 and 1, or it can forward packets to routers R2, R3, or R4. Assume that the router does the longest prefix match. Describe what the router does with a packet addressed to each of the following destinations:

   a. 128.96.171.92
   128.96.1010 1011

The router gets the destination API and uses the routing table to determine where it is going. Using the subnetNumber and the subnetMask the router determines the nexthop should be **Interface 0** in order to get the right nextHop we need to use longest prefix mach.

b. 128.96.167.151
128.96.1010 0111
The router gets the destination API and uses the routing table to determine where it is going. Using the subnetNumber and the subnetMask the router determines the nexthop should be **R2**

c. 128.96.163.151
128.96.1010 0011
The router gets the destination API and uses the routing table to determine where it is going. Using the subnetNumber and the subnetMask the router determines the nexthop should be **R4** since there is not a match to that IP in the router table it uses the default.

d. 128.96.169.192
128.96.1010 1001
The router gets the destination API and uses the routing table to determine where it is going. Using the subnetNumber and the subnetMask the router determines the nexthop should be **Interface 1**

e. 128.96.165.121
128.96. 1010 0101
The router gets the destination API and uses the routing table to determine where it is going. Using the subnetNumber and the subnetMask the router determines the nexthop should be **R3**

SubnetNumber	SubnetMask	NextHop
128.96.170.0	255.255.254.0	Interface 0
128.96.168.0	255.255.254.0	Interface 1
128.96.166.0	255.255.254.0	R2
128.96.164.0	255.255.252.0	R3
⟨default⟩		R4

170 = 1010 101* 254 = 1111 1110
168 = 1010 100*
166 = 1010 011*
164 = 1010 01** 252= 1111 1100